

#30/Reg. for.
Reconsider.
Hawkins
PATENT 10/22/02

Practitioner's Docket No.: 789_056

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Yukihiisa TAKEUCHI and Kazuyoshi SHIBATA

Ser. No.: 09/677,304

Group Art Unit: 2834

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Filed: September 29, 2000

Examiner: Dougherty, T.

OCT 1 - 2002

Confirmation No.: 2413

TECHNOLOGY CENTER 2800

For: PIEZOELECTRIC/ELECTROSTRICTIVE DEVICE

Assistant Commissioner for Patents
Washington, DC 20231

CERTIFICATION OF FACSIMILE
TRANSMISSION

I hereby certify that this paper is being facsimile
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October 1, 2002 at (703) 872-9319.

Tara L. Preston
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REQUEST FOR RECONSIDERATION

Sir:

The following remarks are in response to the Final Office Action mailed April 4, 2002, and further to the RCE filed August 30, 2002 and Amendment filed September 4, 2002.

Examiner Dougherty is thanked for courtesies extended to Applicants' representatives during the personal interview on September 10, 2002. During the interview, Examiner Dougherty requested that applicants resubmit the arguments of record with respect to the use of the claimed unimorph P/E elements as distinguished from the bimorph P/E elements disclosed in Aoki, as well as any new arguments, for his reconsideration. The following remarks are in response to this request.

1. Claims 1-8 are pending herein. Claims 1-3, 6 and 7 were rejected under §103(a) over Aoki. This rejection is respectfully traversed.

Before discussing the rejection of record, Applicants briefly reiterate prior explanations of the present invention, with reference to claim 1 and Fig. 1 of the present application. A pair of mutually opposing metal thin plate sections 12a and 12b are supported by a fixation section 14. One or more P/E elements 20a and 20b are arranged on at least one

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thin plate section. Claim 1 was amended in the Amendment filed on March 22, 2002 to recite that the P/E elements are of the unimorph type. An object 18 is attached to forward end portions 32a and 32b of the thin plate sections. An areal size of a surface of the object 18 interposed between the thin plate sections is larger than an areal size of object attachment surfaces 34a and 34b (shown more clearly in Fig. 2 of the present application) of the thin plate sections.

As explained in the Amendment filed on March 22, 2002, Aoki discloses a bimorph-type piezoelectric actuator. With reference to Figs. 2 and 4 of Aoki, active piezoelectric elements 10 are positioned on upper and lower surfaces of a common electrode 9. As explained above, amended claim 1 recites that one or more *unimorph* P/E elements are arranged on at least one thin plate section of the pair of thin plate sections. Consequently, the bimorph structure disclosed in Aoki fails to disclose or suggest the "unimorph P/E elements" feature of amended claim 1.

The PTO is contending that one skilled in the art would have found it obvious to modify Aoki's bimorph-type piezoelectric actuator by simply omitting a piezoelectric/electrostrictive (P/E) element on one side of one of Aoki's thin plate sections to thus provide unimorph actuators instead (see Final Office Action, page 3). It is noteworthy that the PTO has failed to cite any references in support of its position that bimorph actuators are equivalent to unimorph actuators.

In an attempt to support this position, the PTO states that "it has been held that omission of an element and its function in a combination where the remaining elements perform the same functions as before involves only routine skill in the art" (page 3 of the Final Office Action). The motivation to omit an element, however, must not come from applicants' own disclosure. Moreover, applicants respectfully submit, that omitting one of Aoki's P/E elements would not result in a device "where the remaining elements perform the

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same function as before."

Again, Aoki discloses the use of bimorph P/E elements in a piezoelectric actuator. Pending claim 1 recites, however, that one or more unimorph P/E elements are arranged on at least one thin plate section. Applicants respectfully submit that there is a distinct difference between unimorph and bimorph actuators, as will be explained below.

Fig. 9(a) of Aoki, which is reproduced below in annotated form, shows a common electrode sandwiched between two P/E layers (I and II) to form two, spaced bimorph P/E elements. While compressive forces are generated at positions A and D, tensile forces are generated at positions B and C. In Aoki's bimorph structure, compressive force A and tensile force B are each generated by first P/E element I. Tensile force C and compressive force D are each generated by second P/E element II. In operation, as the first P/E element I compresses at position A, the second P/E element II expands at position C. Similarly, as the second P/E element II compresses at position D, the first P/E element I expands at position B.

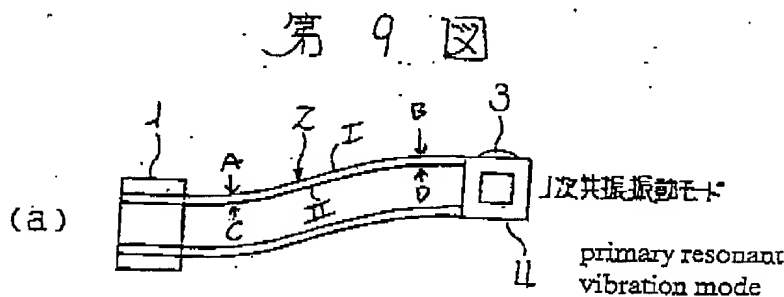


Fig. 9(a) of Aoki illustrates a resonant condition. More specifically, Aoki's bimorph P/E elements are driven at a single, primary resonant frequency. As such, Aoki's electrodes are specifically designed to suppress amplitudes at higher-order resonant frequencies, which results in Aoki's bimorph P/E device being driven only at the desired primary resonant

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frequency. Aoki, therefore, teaches that the resonating pattern illustrated in Fig. 9(a) is the intended result when operating Aoki's P/E device at the primary resonant frequency, regardless of the positioning of the electrodes in Aoki's P/E device.

There is no disclosure in Aoki that would have motivated one to omit one of Aoki's P/E elements from one side of Aoki's thin plate sections, as asserted by the PTO.¹ Skilled artisans would readily understand that such an omission would result in Aoki's P/E element having a decreased thickness, which, in turn, would have the following effects: the resonant frequency would decrease; the weight of the P/E element would decrease; and the overall generating power of the actuator would be diminished. As such, omitting one of the P/E elements from Aoki's bimorph structure would render the resonant condition or displacement action shown in Fig. 9(a) unobtainable without further significant *and undisclosed* modifications of Aoki's P/E device.² Consequently, the omission/modification of Aoki's structure would not result in a device "where the remaining elements perform the same function as before" as asserted by the PTO.

In addition, if electrodes were positioned only in the central part of Aoki's P/E element and driven at a frequency lower than the primary resonant frequency, only that part of the P/E element would be displaced. Consequently, Aoki's P/E elements would displace at a decreased frequency, which would be different from the desired resonating pattern. Thus, if one of Aoki's P/E elements were omitted as asserted by the PTO, the resultant structure would yield inferior displacement performance. Applicants respectfully submit that there certainly would have been no motivation for one skilled in the art to modify Aoki to gain

¹ When relying upon a modification of prior art, it is incumbent upon the Examiner to identify some suggestion to make the modification. *In re Jones*, 958 F.2d 347, 351, 21 USPQ 2d 1941, 1943 (Fed. Cir. 1192).

² Again, the PTO has failed to cite any references that support the contention that a skilled artisan would consider unimorph and bimorph actuators to be equivalent or interchangeable.

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inferior performance characteristics.

In view of the foregoing, reconsideration and withdrawal of the §103 rejection over Aoki are respectfully requested.

Nor does Aoki disclose or suggest the subject matter of new claim 8. As is clearly shown in the drawings in Aoki, the P/E operating portions (i.e., the portions in which a P/E layer is sandwiched between electrodes) of piezoelectric elements 10 do not extend from an outer surface of the fixation section onto at least a portion of the thin plate sections. New claim 8 corresponds to claim 7 (which was added in the March 22, 2002 Amendment) with the additional limitation that a P/E operating portion is defined between opposed electrodes and extends from *an outer surface of* the fixation section onto at least a portion of at least one of the thin plate sections. Extending a portion of the P/E operating portion over the outer surface of the fixation section is important because it provides an anchor which facilitates greater displacement of the movable section (page 18, line 22--page 19, line 4 of the present application).

Examiner Dougherty indicated during the personal interview that claim 8, as submitted above, would receive favorable consideration over Aoki. Accordingly, new claim 8 is also allowable over Aoki.

During a telephonic interview on June 27, 2002, Examiner Dougherty questioned whether Fig. 1 in the present application shows P/E elements that could be interpreted as being bimorph P/E elements. Applicants responded to this point in detail in the Request for Reconsideration filed August 2, 2002. In the interest of brevity, that discussion will not be reiterated herein. Applicants direct Examiner Dougherty's attention to pages 4-6 of the Request for Reconsideration.

For all of the foregoing reasons, Applicants respectfully submit that all pending claims herein are in condition for allowance. Accordingly, Examiner Dougherty is requested to issue

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a Notice of Allowance for this application in due course.

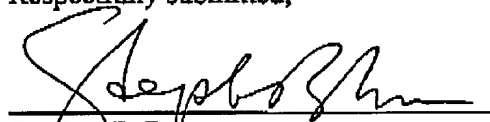
If Examiner Dougherty believes that further contact with Applicants' attorney would be advantageous toward the disposition of this case, he is herein requested to call Applicants' attorney at the phone number noted below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-1446.

Respectfully submitted,

October 1, 2002

Date



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